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IS THERE A LARGE, UNKNOWN PRIMATE IN CHINA? THE CHINESE YEREN OR WILDMAN

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ABSTRACT: The authors undertook an evaluation of the evidence for the Yeren or Wildman during a two-month visit to China. Evidence such as "monkey babies," footprint casts, and fecal remains proved useless. Eyewitnesses were interviewed, and this evidence is considered generally reliable and consistent. Discussions were held with Chinese scientists who had undertaken studies of purported Yeren hair using both scanning and transmitting electron microscopes (SEM and TEM), and an analytical technique called proton-induced X-ray emission (PIXE) spectrometry. The results of both kinds of analyses suggest the possible presence of a scientifically-unknown higher primate in China. The PIXE analysis was replicated in Britain, with the same results. The *Gigantopithecus*-Yeren ancestral-descendant hypothesis is discussed. As some eyewitnesses described red hair combined with quadrupedal locomotion, the possibility of a surviving population of mainland Asian orang-utans is also addressed.

INTRODUCTION

"The centuries-old riddle of the Chinese Wildman remains unresolved. There is currently not enough evidence to prove the existence of such creatures. Scientific discretion dictates that we either reject claims for the existence of such creatures, or at least withhold judgment until some valid, verifiable evidence is produced. Until contrary evidence is absolutely convincing, however, there is always a possibility that the Wildman exists—but one should not hold one's breath" (Poirier, Hu, and Chen 1983: 39). There now exists some evidence of the possible existence of the Yeren—a term which translates into English as "Wildman."

There have been written reports of the Chinese Yeren for over 2,000 years. Within the past 40 years, reports of sightings and encounters have come from the provinces of Guizhou, Hubei, Sichuan, Shanxi, the Tibet Autonomous Region, Yunnan, and Zhejiang. Most reports come from Sichuan and Hubei, especially from areas bordering the Shennongjia forest reserve—home to many of China's rare mammals. A review of the ecology of Shennongjia appears in Poirier, Hu, and Chen (1983). The largest and most extensive search for the Yeren occurred in Shennongjia in 1977 and 1979 to 1980. The 1977 research team included scientists from China's Institute

of Vertebrate Paleontology and Paleoanthropology. Despite their efforts, nothing of note was found (Shang 1981, Zhou 1982).

In October and November, 1989, the current authors, as part of a television documentary film project, investigated Yeren sightings in Sichuan, Guizhou, Yunnan, and Hubei provinces (Greenwell and Poirier 1989). The documentary film, *The Wildman of China*, was first broadcast in 1990.

DESCRIPTION OF THE CHINESE YEREN

There are no known photographs, undisputed bodies, or skeletal remains. Although the Yeren has reportedly been killed and/or captured on several occasions, no bodies have ever been made available for study. On the other hand, there are centuries of purported contact, drawings, and lengthy descriptions. Physical evidence has been presented in the form of footprint casts, fecal remains, nests, so-called "monkey babies," severed hands and feet, and hair. A more extensive review of this purported evidence appears in Poirier, Hu, and Chen (1983), and Zhou (1982). Interviews with eyewitnesses (one of whose reports led to the above-mentioned Shennongjia expeditions) appear in Greenwell and Poirier (1989).

Eyewitness descriptions are generally difficult to evaluate. The problem is compounded with the Yeren because some descriptions are thousands of years old. Most recent descriptions come from a variety of sources, including government officials, forestry workers, soldiers, and local villagers. Most sightings are reported by villagers. There has been no attempt by scientists to systematically interview a significant number of supposed eyewitnesses. There are many reasons for this, including: 1) a disavowal of such animals by the scientific establishment, and 2) a less than charitable attitude expressed towards the village peasants making the reports. This has left the investigation to generally unqualified individuals.

A general description of the Yeren follows. The reputed animal is large—the greatest reported height is over 10 feet (3 m), but most reports cite a height of about 6.5 feet (2 m). Zhou (1982) gives a range of 4–8 feet (1.2–2.5 m). Weight is estimated to be as high as 500lb (225 kg). The arms are shorter than the legs, and the human-looking forelimbs are not used in locomotion. The hands are capable of precision grip and manipulation. The animal is generally reported to walk bipedally and flat-footed. (However, some interviewed eyewitnesses mentioned the animal fleeing quadrupedally—see below.) One footprint cast measured 19 inches (48 cm). The first and second toes are diverged. There is no tail.

One trait agreed upon by modern and historical reports alike is that the Yeren has long hair, variously described as reddish, brown, golden, or white. The hair on the back is especially long. The face and jaw are prognathic. In some reports, the nose is prominent. The stomach may be described as large, and, by some accounts, female breasts and the penis are pendulous.

There are reports of its diet (vegetarian) and social behavior, or general lack thereof. The animal generally described manifests a mix of human and nonhuman primate traits in both its morphology and behavior. (See Poirier, Hu, and Chen [1983] for a further description.)

Before discussing the latest findings, we shall briefly evaluate the physical evidence mentioned above. Most of the kind of evidence presented as proof of the Yeren's existence was examined either by Poirier in 1982 or by the current authors in 1989.

Evaluation of Evidence

1) Monkey babies: A birth defect produces a condition that local people refer to as "monkey babies." Afflicted children are claimed to result from a mating (usually a rape) between a male Yeren and a female villager. (Rarely is a male villager reported raped by a female Yeren). The children are born with multiple physical and mental handicaps. The physical deformities affect the limbs, face, and skull most prominently. Poirier met one such child in 1982 while working in central Hubei. In 1989 we saw the skeleton of another individual. Zhou (1982) studied this young adult male skeleton and concluded that it was merely of a seriously deformed human—a conclusion with which we agree.

2) Footprints: More than 1,000 Yeren footprints have been reported. Some were casted and/or photographed. Because very few casts are of a quality to be closely evaluated, they are probably worthless as scientific specimens.

3) Fecal remains and nests: Although we did not see this evidence, we think it is of dubious value. Chinese giant panda experts who have seen the nests and fecal remains suggest a close resemblance of both to those of the giant panda. However, giant pandas are not known to inhabit areas where the Yeren is reported. The fecal remains belong to an omnivore.

4) Eyewitness accounts: There are numerous problems with eyewitness accounts. The wide publicity that supposed Yeren sightings receive could color the reports and/or lead to some misinterpretation and possibly deception. Our interviews in 1989 produced some new details, and in all seven cases we concluded that the witnesses had nothing immediately to gain by deception. Many animals, including rhesus macaques, the endangered gibbon, the snub-nosed monkey, and bears have been called the Yeren at one time or another. Although many eyewitness accounts are generally considered unsatisfactory, such reports show a consistency and have a legacy of more than 2,000 years.

5) Severed appendages: Hands and feet were reportedly once severed from a Wildman by villagers warding off an attack. An extensive investigation of such severed appendages was reported by Zhou (1984), who concluded that the specimens came from a large—perhaps scientifically undescribed—macaque. We saw these specimens in 1989; they belonged to a terrestrial macaque.

Results of Hair Analyses

A few hundred hairs have been collected by people who reportedly either encountered a Yeren or plucked its hair from the ground or a tree. Most written and oral accounts report an animal with long reddish, golden, or brownish hair. Some Yeren hairs have been analyzed by use of both scanning electron microscopes (SEM) and transmitting electron microscopes (TEM). One study involved Keratin content analysis. Some hairs have also been subjected to an analytical technique called proton (or particle) induced X-ray emission (PIXE) spectrometry. These analyses were conducted in China and in Britain.

SEM and TEM Analyses

SEM and TEM analyses of Yeren hairs were conducted by Cao et al. (1987) in the Biology Department of East China Normal University, Shanghai. Cao and his colleagues compared four supposed Yeren hairs from different localities in China—three from Sichuan and one from Zhejiang—with hairs from a(n): 1) white-browed gibbon; 2) rhesus macaque; 3) common chimpanzee; 4) Asian black bear; 5) serow; and 6) modern Chinese human. The gibbon and chimpanzee hairs came from zoo animals; the macaque, black bear, and serow hairs were from Shennongjia—the site of many Yeren reports. The study by Cao et al. (1987) focused on the shape of the cuticular scales; the size of the medulla and the compactness of microfibers in the medulla; and the density, number, and scatter of pigment granules. Kassenbeck (1979) and, to a lesser extent, Rosen (1974) discuss the use of cuticular scales as a means of identification, and Clement et al. (1981) discuss hair identification using SEM and TEM techniques. Rosen (1974) has cautioned that cross-sectional areas of human hair are generally similar to those of Old World monkeys.

When compared with the six known animals (1–6 above), the supposed Yeren hairs yielded the following results:

1) Two hairs from Sichuan show similarities to one another. One hair is brownish and glossy, while the other is golden and glossy. The hairs are similar in their pigment distribution and the size and density of their medulla. In these features, they differ from the hair of nonhuman primates, black bear, and serow, but are similar to human hairs. However, they differ from Chinese human hairs in coloration. (In this remote region of China, it is unlikely that the hair is from a non-Chinese human.) Cao et al. (1987) conclude that the brown hair belongs to the unknown primate currently known as Yeren. This hair comes from Wuxi, Sichuan province, a center of Yeren reports.

The supposed Yeren hair has veins that are densely compacted in the medulla (16 rows/100u), the medulla is small, the number of pigment granules is small and distributed in the outer range of the cortex. In the Chinese human hair sample, the medulla is small, a moderate number of pigment granules are distributed in the outer range of the cortex, and the veins are densely compacted in the medulla. The only real contrast here between Yeren and Chinese human is where the pigment granules are distributed. The significance, if any, of this difference is not known. Given the similarities between the purported Yeren hair and the hair of a modern Chinese human, it cannot be ruled out that this sample is from a modern Chinese human. The nonhuman animal hair sample had veins sparsely compacted in the medulla, a large medulla, and pigment granules distributed around the center of the cortex. Clement et al. (1981) have noted that only human hairs have a clear microfibrillar and macrofibrillar ultrastructure. The presence of such structures in the supposed Yeren hair indicates either a misidentification of a modern Chinese human hair as that of a Yeren (which pigment differences and PIXE analysis seem to discount), or that the hair comes from an animal closely related to humans.

2) The hair from Zhejiang province does not belong to a macaque. It was a yellow and brown color.

3) The fourth hair sample, said to be at least five generations old, could not be accurately analyzed because of its age. It was bright red.

Brian McCarthy, at the British Textile Technology Group, who has over 40 years experience in the analysis of animal fibers and who has worked on the Shroud of Turin, examined three supposed Yeren hairs under a SEM. These hairs (which were not analyzed by SEM or TEM in China) were provided to Geraldine Easter by different sources in China. Two hairs are from the Wuxi area in Sichuan. McCarthy's analysis indicated that the hairs were either from a human or another higher primate (personal communication, Brian McCarthy to Geraldine Easter, 1991).

Keratin Content Analysis

X. He, P. Yan, and M. Liu (Studies on Keratins of Some Unknown Animal Hairs, unpublished manuscript, in Chinese) analyzed the keratin content of hair from humans, chimpanzees, orang-utans, gibbons, baboons, black bears, and pigs. The results were compared to three supposed Yeren hairs, one each from Guizhou, Sichuan (Wuxi), and Hunan provinces. The purported Yeren hairs had a higher acid protein content, and contained 16 amino acids versus the 17 amino acids found in the hairs from other animals. The missing amino acid was not specified. The range of variation of these features in humans is not available to the authors at this time.

PIXE Analysis

The first application of the PIXE method to trace analytical problems was published in 1970. The high sensitivity afforded by PIXE, its simultaneous multi-element capability, and the small sample size requirements, make it ideal for studying trace elements in biological samples. PIXE analyses have been used to uncover faked manuscripts and works of art (Cahill and Kusko 1981), to determine the chemical element contents of meteoritic samples, to measure water and air pollution, and to examine trace elements in bone, skin, hair, blood, albumens, cell walls, and tooth enamel, among others. PIXE can be used by archaeologists (Zeng et al. 1989) to determine the origins of pottery (Baijot-Stroobants and Bodart 1977) and of artifacts (Campbell 1977), and should be very useful in identifying dietary patterns and diseases in faunal samples. The uses to which PIXE can be put, limitations of the procedure, and details about sample preparation are found in *Nuclear Instruments and Methods,* Vol. 181 (1981), pages 1–343; and Vol. B (1984) pages 105–701.

Hair has been a rather common subject for PIXE (Valkovic 1977). (See also pp. 347–360, *Nuclear Instruments and Methods*, Vol. B, [1984]). Before hair is analyzed by PIXE, it must undergo proper preparation. Surface contamination can pose a problem (Campbell 1979), and the thickness of the specimen needs to be considered (Baptista et al. 1981, Campbell 1977, 1979, Willis and Walter 1977). Some problems have been encountered in the direct analysis of hair by irradiation because hair strands are thick with respect to the particle energy usually employed, and some of the light element X-rays are attenuated to a considerable extent (Mangelson and Hill 1981). To overcome the problem of destroying a sample by overheating, PIXE is used in combination with the external beam technique (Raith et al. 1981). A number of articles in *Nuclear Instruments and Methods*, Vol. B (1984), discuss using external beam techniques for analyzing thick targets.

A number of purported Yeren hairs underwent PIXE analysis in the Department of Nuclear Science at Fudan University, in Shanghai, and the Shanghai Institute of Nuclear Research (Li, Zeng, and Hua 1987, Qin et al. 1988, Zeng et al. 1990). Previous hair analysis at Fudan University was published by Chen et al. (1981). Three Yeren hairs were also analyzed by PIXE by Ranjeet Sokhi in the Department of Physics and Space Research, University of Birmingham, England. These three hairs also underwent PIXE analysis in China, and they are the same hairs studied by Brian McCarthy of the British Textile Technology Group by SEM.

Li, Zeng, and Hua (1987) conducted a PIXE analysis of ten supposed Yeren hairs, the results of which were compared with analysis results of hair from eight healthy Chinese humans, and hairs from the snub-nosed monkey, a gibbon, an orang-utan, and a chimpanzee, as well as hair from both the

Asiatic black and Asian brown bear. PIXE analysis resulted in three distinct groupings. The first group included the human hair samples and only one Yeren hair; the second group contained *only* three of the 10 hairs originally designated as Yeren hairs, and the third group contained all the other hairs, including six originally designated as Yeren hairs.

Using PIXE, Li and his colleagues reclassified some of the supposed Yeren hairs. One hair was from a human, and six hairs belonged to other known animals. From the original sample of 10 so-called Yeren hairs, three hairs differed in their trace element content from all the other hairs. Two of these hairs were red, and one was yellow and white. The Fe/Zn ratio of the three Yeren hairs was found to be 54 times higher than that of the Chinese human hairs, and 8.1 times higher than that of all the other animals used in the comparison. Furthermore, the ratios of Ca, Mn, Fe, Cu, and Zn in the Yeren hairs differed from the ratios of the same elements in the human and nonhuman primate sample. All three hairs came from Sichuan, and two came from the Wuxi area. If the high Fe/Zn ratio found in the Yeren hairs is a significant differentiating feature, then a similarly high ratio should be found in all hairs attributed to the Yeren—no matter their locale of origin.

To test the diagnostic function of the Fe/Zn ratio, Li and his colleagues added three more supposed Yeren hairs to their sample. These were all red, and came from Guizhou and Hunan provinces. Using the same procedures as in the original analysis, these hairs were compared with monkey and bear hairs. As before, the Fe/Zn ratio of the three Yeren hairs was significantly different from that of the monkey and bear hairs. Combining data from both tests, Li, Zeng, and Hua (1987) showed that the Fe/Zn ratio in the six Yeren hairs was 50 times higher than that of human hairs, and 7 times higher than that of the nonhuman animal hair sample. Despite the fact that the six Yeren hairs came from three different provinces, they all had a similarly high Fe/Zn ratio. Because the hairs came from different regions, and were handled by different people, but all still showed a similarly high Fe/Zn ratio, contamination can probably be ruled out as an explanation for the high Fe/Zn ratio.

Qin et al. (1988) conducted a PIXE spectrophotometry analysis of 26 hairs: five supposedly came from the Yeren; two from unidentified animals that might have been the Yeren; six from modern nonhuman primates (snub-nosed monkey, two Chinese macaque species, hoolock gibbon, orang-utan, and chimpanzee); one hair each from an Asian brown bear and a serow; two hairs from the Asiatic black bear; and nine from modern Chinese humans (females and males ranging in age from 23 to 52 years). The five reported Yeren hairs were red, and came from Guizhou, Sichuan (Wuxi area), and Hunan provinces. One of the two hairs from the unidentified animals came from Wuxi, and was brown in color. This is the same hair that the SEM and TEM analyses by Cao et al. (1987) determined belonged to the Yeren sample.

PIXE analysis of this hair supported the SEM and TEM determinations that the hair came from an unknown primate. At least this is the considered opinion of a number of Chinese scientists.

The sequence of concentrations of the four most common elements found in human hair seems to be Ca>Zn>Fe>Cu. The mean content of Ca, Cr, Mn, Fe, Co, Cu and Sr was significantly higher in the Yeren hair than in the human and nonhuman hair samples ($P<0.01$). The nonlinear mapping algorithm (NLM) of the three types of hair indicates that the Yeren, human, and nonhuman hairs (including the monkey and ape samples) have their own distinctive element characteristics.

Ranjeet Sokhi analyzed three Yeren hairs in his laboratory in Birmingham, England. (These are the same hairs that Brian McCarthy at the British Textile Technology Group had analyzed by SEM.) These three hairs had also been analyzed by PIXE at the Nuclear Science Department at Fudan University, Shanghai. That work was conducted by X. Zeng. The hairs were not cleaned prior to analysis. In Zeng's analysis, two of the three hairs had showed the high Fe/Zn ratio seemingly common to Yeren hair samples. Sokhi's analysis showed that the Yeren hair had a Fe/Zn ratio 30 times higher than that found in human hair. (We are uncertain whether or how melanin content might affect these figures.) Sokhi (personal communication, 1991) reported: "All we can really conclude is that these hairs (which are claimed by some to be from Wildman) show entirely different elemental characteristics to normal human hair, which is extremely difficult to explain. I'm surprised we've shown such a high level of agreement with Shanghai's analysis—very surprised."

Because neither Sokhi nor Zeng cleaned the hairs prior to analysis, perhaps their results were somehow affected by contamination. However, the comparability of their data suggests that the lack of cleaning is not relevant to the results. Furthermore, because all three hairs originate from different times and places in China, it seems too coincidental that they all should suffer from similar contamination. The combined results of the various hair analyses discussed above are summarized in Table 1.

What is the Yeren?

Hair analyses suggest the possibility that an animal which the Chinese refer to as Yeren may exist. If this animal does exist, what could it be? Listed below are three explanatory hypotheses.

1) One hypothesis attributes all reports to observations of scientifically known animals, or to hoaxing. The SEM, TEM, and PIXE data seem to void this as a strong possibility.

2) Another hypothesis is that most Yeren reports refer to some kind of scientifically-unknown nonhuman primate. Our 1989 interviews suggest that perhaps two primates are being described. One is a very large bipedal animal

TABLE 1.—Combined results of hair analyses of purported Chinese Yeren hairs.

Yeren	Human	Nonhuman primates
Thickly compacted veins in medulla	Same as Yeren	Sparsely compacted veins in medulla
Small medulla	Same as Yeren	Large medulla
Small number of pigment granules	Moderate number	
Pigment granules distributed in outer range of cortex	Evenly distributed throughout cortex	Distributed around center of cortex
16 amino acids	17 amino acids	17 amino acids

Observations:

Acid protein content higher in Yeren than in human and nonhuman primates.

Fe/Zn ratio is 50 times higher in Yeren samples than in human samples and 7 times higher than in nonhuman primate samples (Li, Zeng, and Hua 1987 study). Fe/Zn ratio is 30 times higher in the Yeren sample than found in humans (Sokhi study).

Ca, Cr, Mn, Fe, Co, Cu, and Sr contents are significantly higher in Yeren samples than in human and nonhuman primate samples.

covered with reddish, golden, or light brown hair, while the other is a smaller quadrupedal primate. Some descriptions of these quadrupeds may refer to orang-utans. The long red hair and prominent stomach mentioned by some eyewitnesses are very reminiscent of orang-utans. Further evidence are the nests, which orang-utans are known to build.

Although there are no verified reports of orang-utans currently extant in China, orang-utan fossils demonstrate that they persisted in mainland Asia at least into the late Pleistocene. Whether they persisted in China into historical times is uncertain, but local myths, as well as 19th century works, such as by Jardine in 1833 and Geoffroy in 1851, support the notion that orangs may have been present in recent centuries. Von Koenignswald (1981) suggested that giant orang-utans might still dwell in such parts of China as Guandong, Guangxi, and Yunnan—the latter two provinces report sightings of the Yeren. Fossil orang teeth found in Chinese herbal shops in the 1930's were traced to caves in Guandong and Guangxi. These teeth came from deposits that also yielded giant panda and serow remains. Von Koenignswald noted that he had many fossil orang-utan teeth whose dimensions exceeded the maximum reached by extant orangs.

Perhaps orangs have somehow survived in parts of mainland Asia. Chinese scientists once took reports of orang-like creatures in Yunnan seriously enough to conduct field surveys (Wu Xinzhi, personal communication, 1989). However, when hairs placed into the Yeren category by PIXE analysis were compared to orang-utan hairs, they were considered to be distinct.

3) A third hypothesis proposes a relationship between the bipedal Yeren and the fossil primate genus *Gigantopithecus*. Two provinces where Yeren

reports are concentrated, Guangxi and Hubei, have yielded *Gigantopithecus* fossils. In terms of its reputed body size and habitat, *Gigantopithecus* makes a good *theoretical* ancestor to the Yeren. However, there is no direct evidence of such a relationship. Interestingly, assuming that such large, unknown primates may actually exist, 80 percent of American and Canadian Ph.D.-level physical anthropologists specializing in primatology and human evolution, when surveyed, supported *Gigantopithecus* as the preferred taxonomic candidate (Greenwell and King 1981).

It is necessary to be very clear about the results of the PIXE and other analyses (summarized in Table 1). PIXE and other analyses showed that some of the hairs attributed to the Yeren are chemically and structurally different from the hair of all known animals in the comparative sample, including human and nonhuman primates. However, these analyses alone do not allow us to place the Yeren in the order Primates. That assignment depends on oral and written descriptions of the animal. PIXE, SEM, and TEM analyses all suggest that the Yeren hair came from either a scientifically unknown animal or to a higher primate. Oral and written descriptions suggest that this animal is a higher primate, more specifically that it is either an ape or a human, or closely related to them.

Future DNA analysis of Yeren hairs should resolve the issue of whether it exists, and to which animal group it is most closely related. As of now, such hair samples must necessarily include the root structures containing sufficient DNA. Attempts at DNA analysis of the above hairs already tested by SEM, TEM, and PIXE have not been possible because of their rootless condition (Frederick W. Miller, personal communication, 1992).

We think it appropriate at this time to open a scientific debate on the possible existence of the Yeren. Given the analytical techniques now available, evidence for the existence of animals such as the Yeren no longer needs to be only in the form of a body or skeletal material. Applying modern analytical techniques to hair samples can result in strong evidence to support or deny the existence of such unknown animals.

CONCLUSION

Very much different from our starting position, especially Poirier (see Poirier, Hu, and Chen 1983), we now conclude that there *may* be some veracity to reports of the Yeren's existence. The possible presence of one and possibly two scientifically-unknown higher primates, covered with long reddish or brownish hairs and reported for over 2,000 years, should be seriously considered by primatologists and mammalogists.

Even if definitive evidence of its physical existence never materializes, the Yeren of China warrants anthropological interest and research. If the Yeren is *not* one or more unknown biological species, it is a folkloric entity that has existed for 2,000 years—a unique situation in its own right.

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